On the Gas Hydrate Phase Behavior of Certain Natural Gas Constituents in the Presence of Some Selected Organic Components

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Gas hydrates are of major interest to gas and oil industry from different points of view. In that perspective, two significant features of gas hydrates are:

- The large storage capacity per Nm^3 for small molecules, like CH_4, CO_2, C_2H_6, etc., compared to compressed natural gas
- The practically more attractive formation and preservation conditions, in terms of pressure and temperature, for gas hydrates compared to liquefying natural gas

Another interesting phenomenon that recently became apparent is that certain organic components show a significant reduction of the gas hydrate phase equilibrium pressure. For instance, compared to the additive free system, pressure reductions as high as 80 % have been observed. Obviously, this property also may offer opportunities for technological application of gas hydrates in other fields than the oil and gas industry only. For many systems the gas hydrate phase behavior in the absence of organic additives is very well-known and understood as well. However, information on the gas hydrate phase behavior in the presence of certain organic additives is very limited. This paper offers experimental information on gas hydrate phase equilibria of systems of the latter category. The organic additive components can be divided into components soluble in water and those insoluble in water. Specifically, this research concentrates on the experimental determination of the phase behavior of systems containing the natural gas constituents CH_4, CO_2 and N_2 in the presence of an organic additive. Electrolytes have the opposite effect on the gas hydrate equilibrium pressure, i.e. they show elevation of the hydrate equilibrium pressure. Therefore, the competing effect between organic additive and electrolyte is also of importance and must be investigated experimentally.